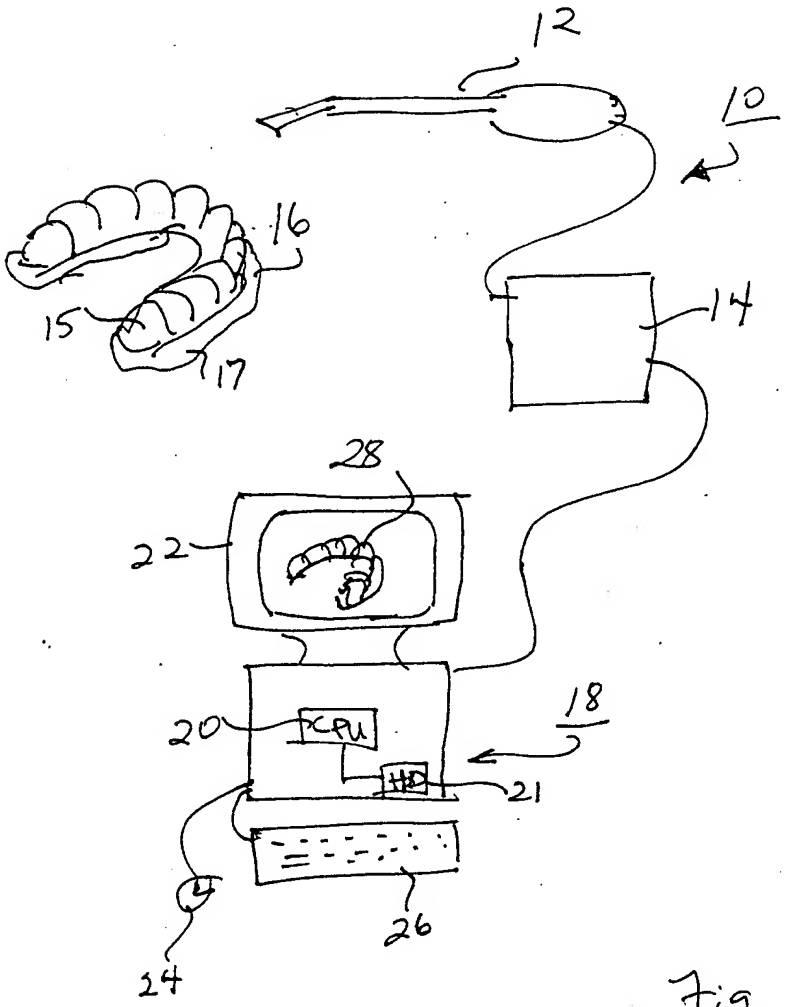


Fig. 1

Fig 2

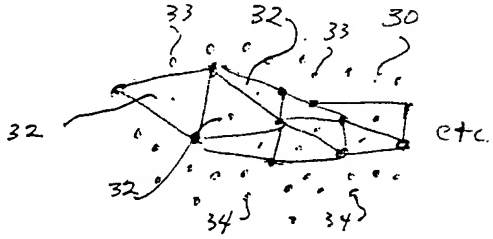


Fig. 3

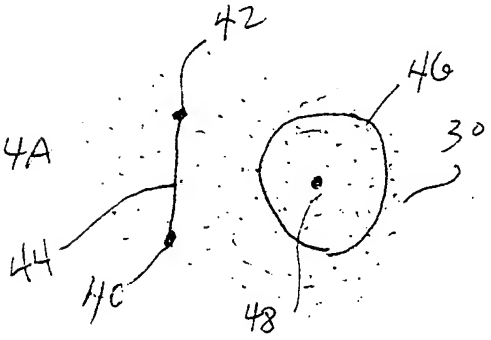


Fig. 4A

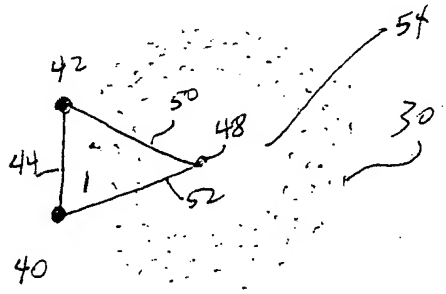


Fig. 4B

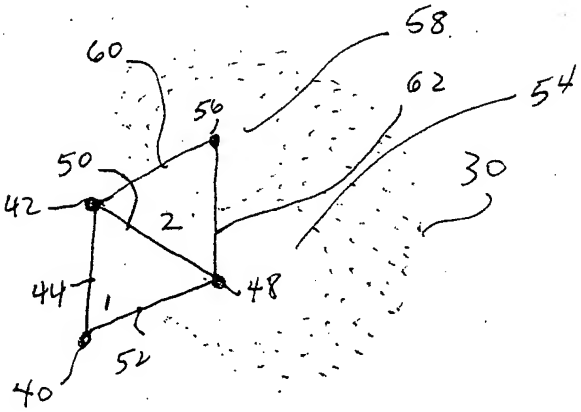


Fig. 4C

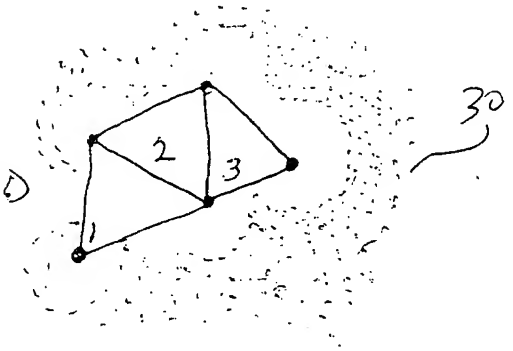


Fig. 4D

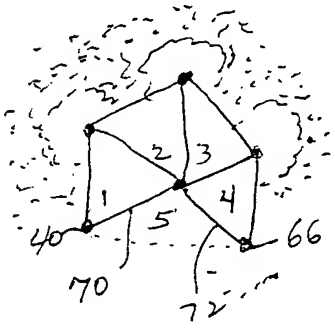


Fig. 4E

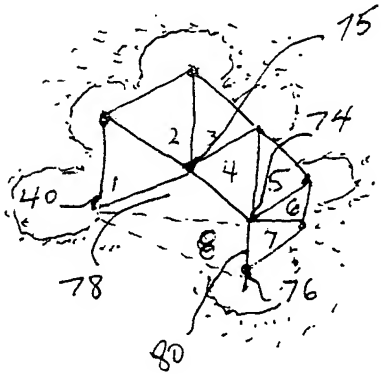


Fig. 4F

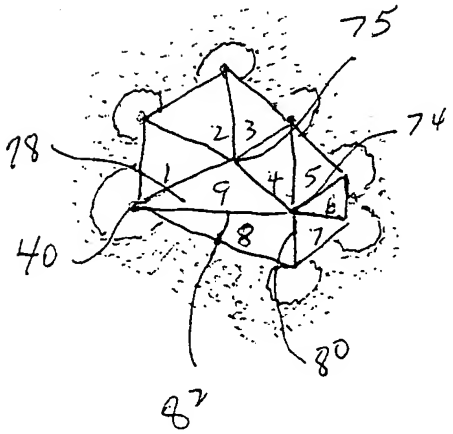


Fig. 4G

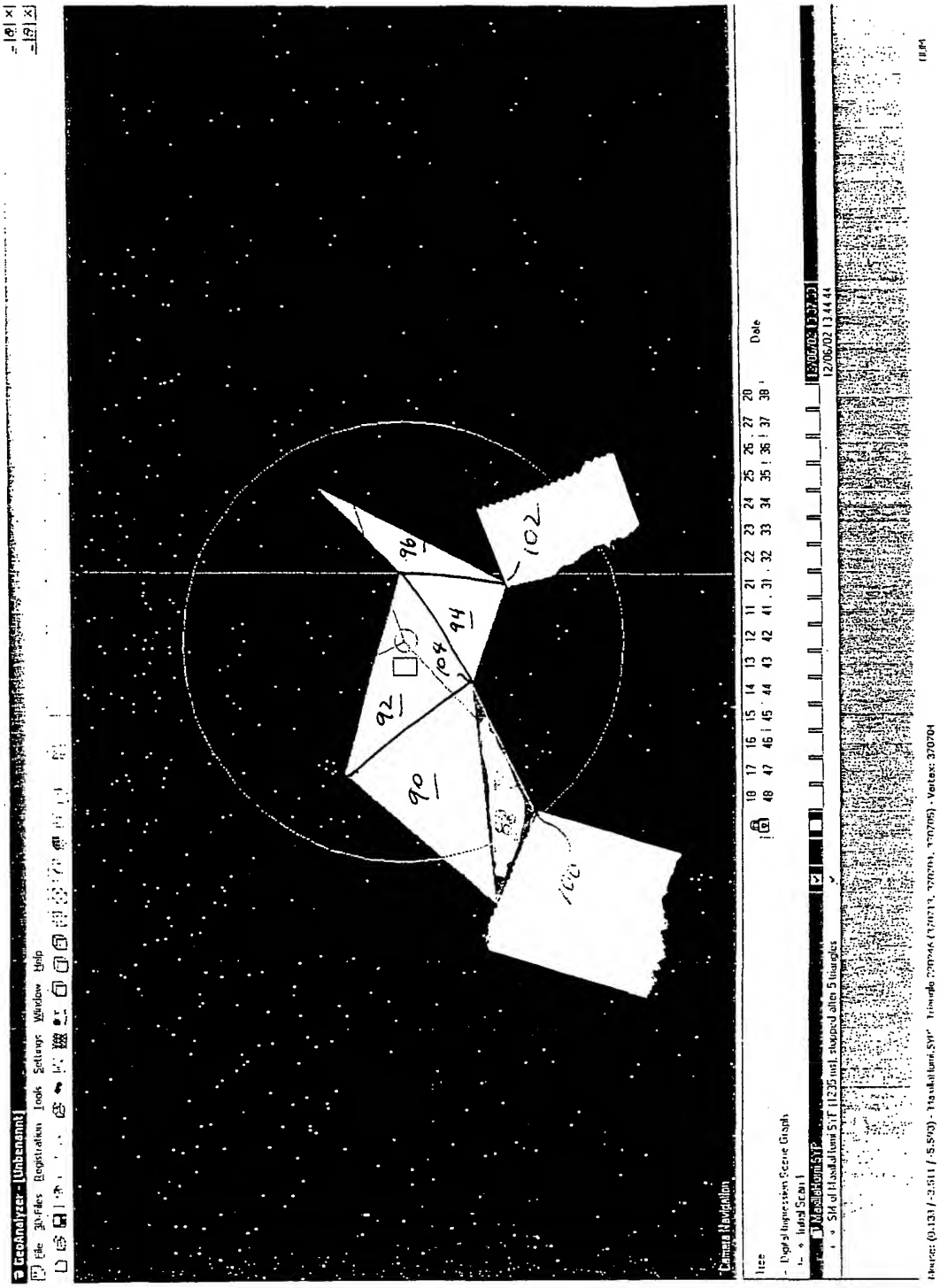

GeoAnalyzer - [Unbenannt]
File 3D-Files Registration Tools Settings Window Help
Camera Navigation
Tree
Digital Ingression Scene Graph
Initial Scan 1
Date
12/06/02 13:44:44
96
102
94
104
92
90
100

Fig. 5

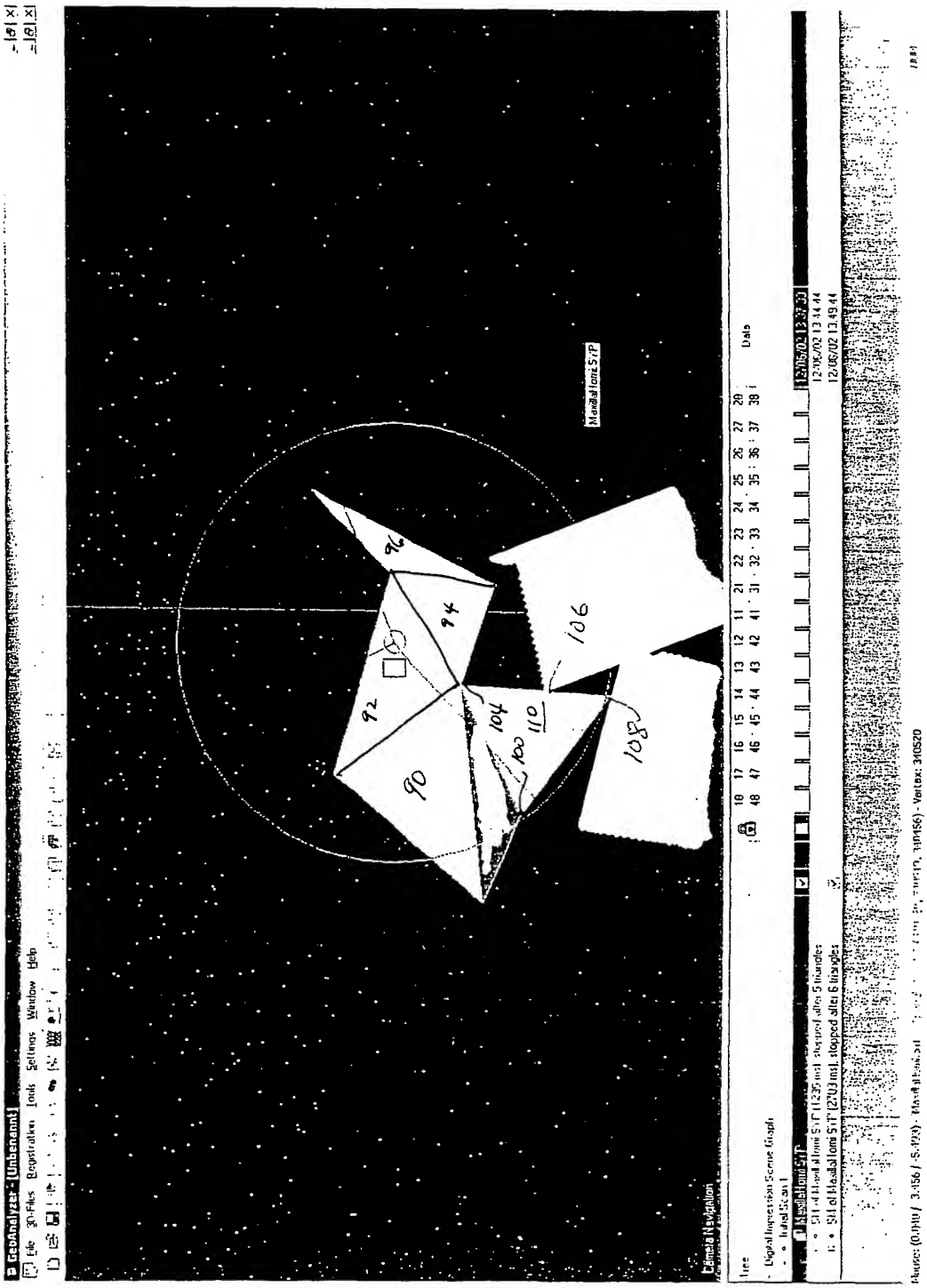

92
94
106
90
104
110
108
Mandibular Set
Camera Navigation
Tree
Digital Inspection Scene Graph
Model Scene 1
Mandibular Set
Set of Mandibular Set (1235 incl. skipped) after 5 triangles
Set of Mandibular Set (2703 incl. skipped) after 6 triangles
12/05/02 13:44:44
12/05/02 13:49:44
Date

Fig. 9.

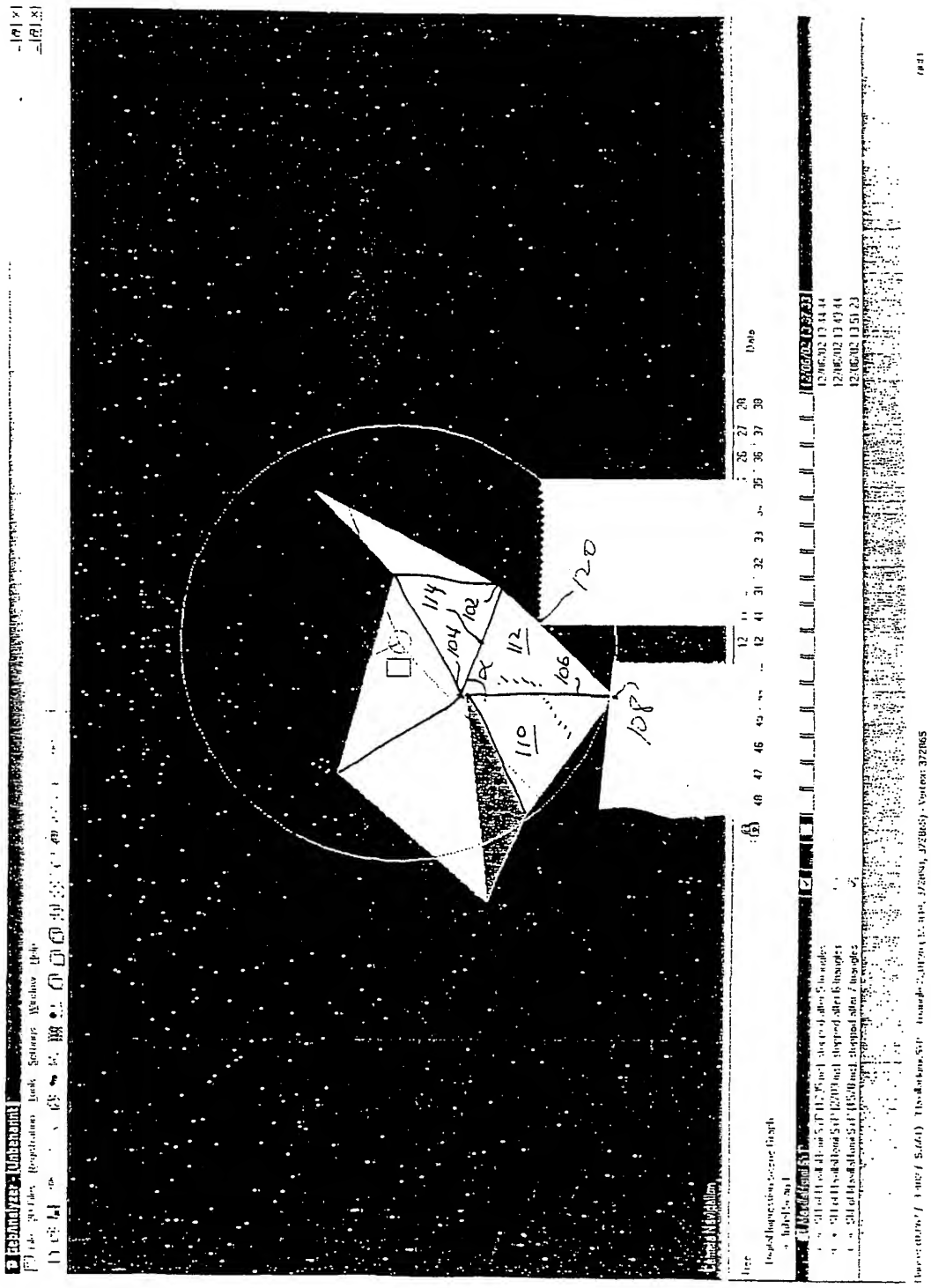


Fig. 7

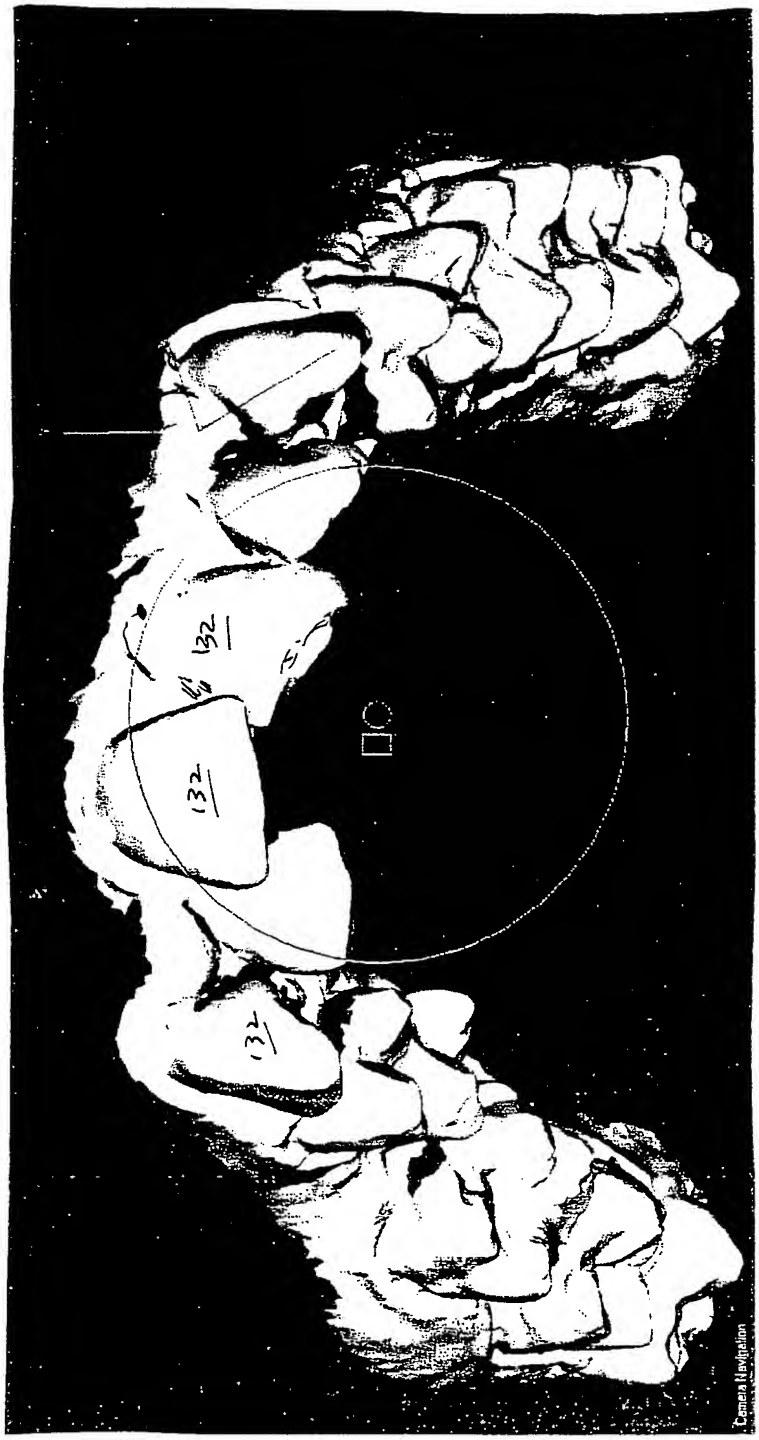


Fig. 8

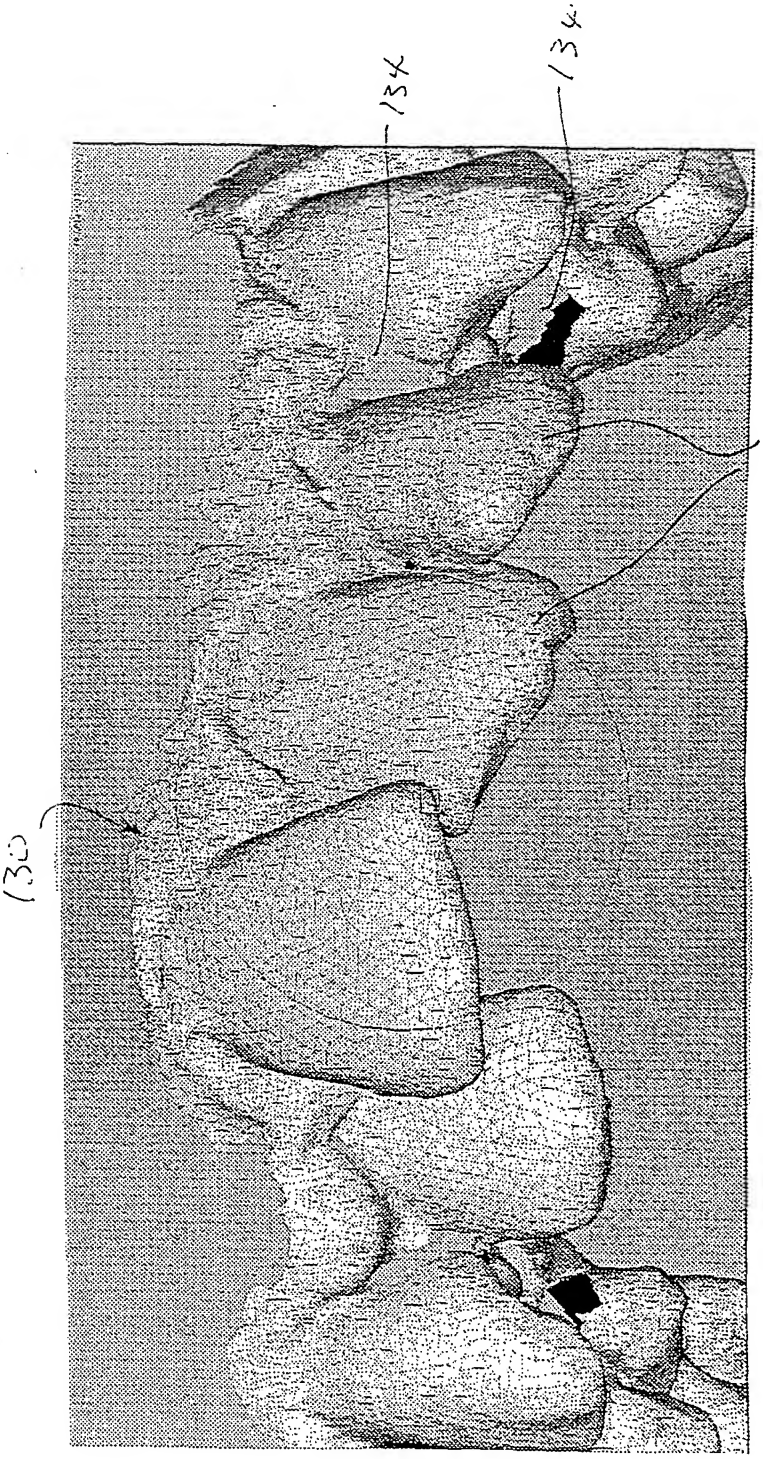
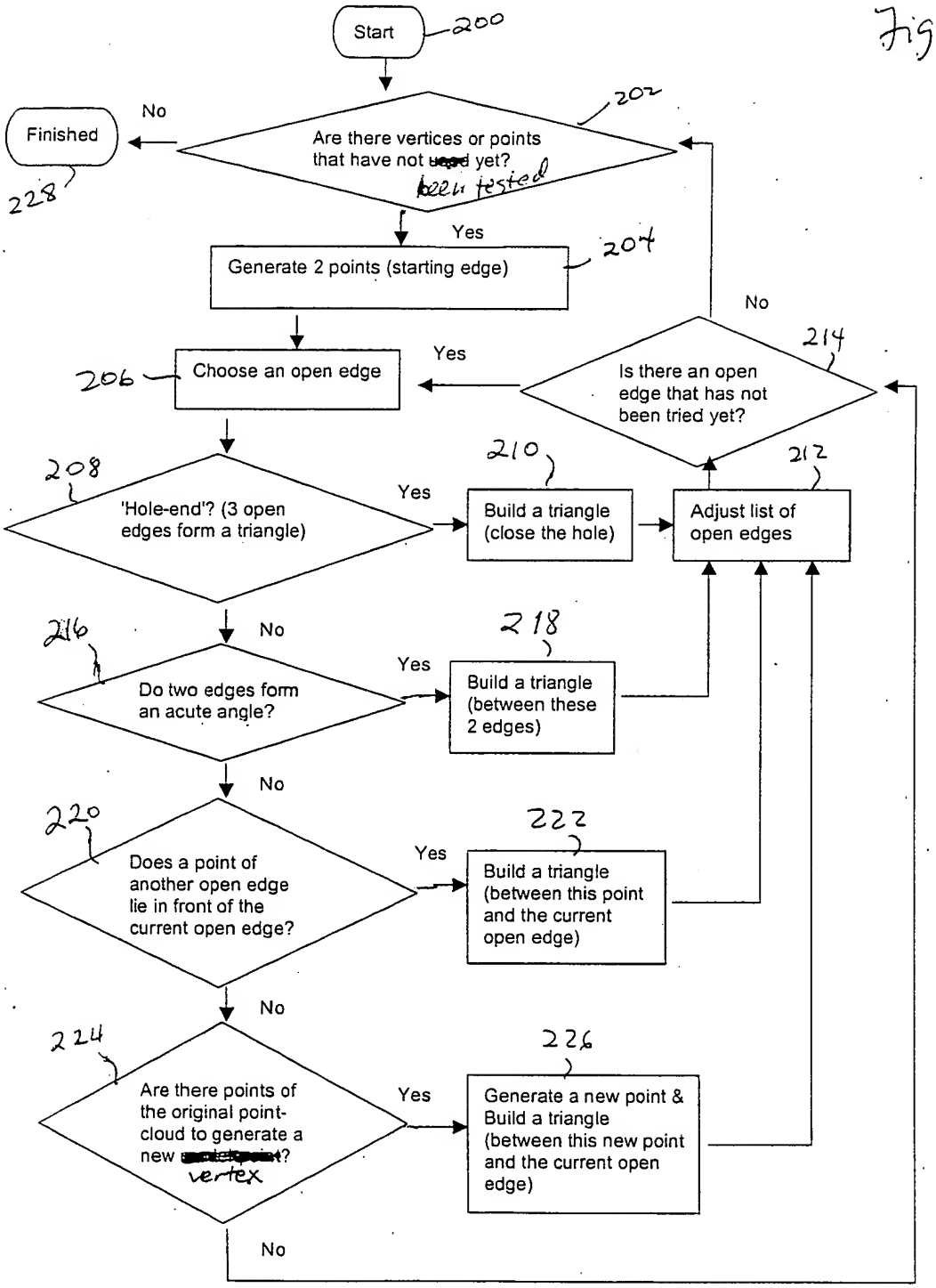


Fig. 9

Fig 10


Start
200
Are there vertices or points that have not been tested yet?
202
No
Finished
228
Yes
Generate 2 points (starting edge)
204
Choose an open edge
206
Yes
Is there an open edge that has not been tried yet?
214
No
'Hole-end'? (3 open edges form a triangle)
208
Yes
Build a triangle (close the hole)
210
Adjust list of open edges
212
No
Do two edges form an acute angle?
216
Yes
Build a triangle (between these 2 edges)
218
No
Does a point of another open edge lie in front of the current open edge?
220
Yes
Build a triangle (between this point and the current open edge)
222
No
Are there points of the original point-cloud to generate a new vertex?
224
Yes
Generate a new point & Build a triangle (between this new point and the current open edge)
226
No

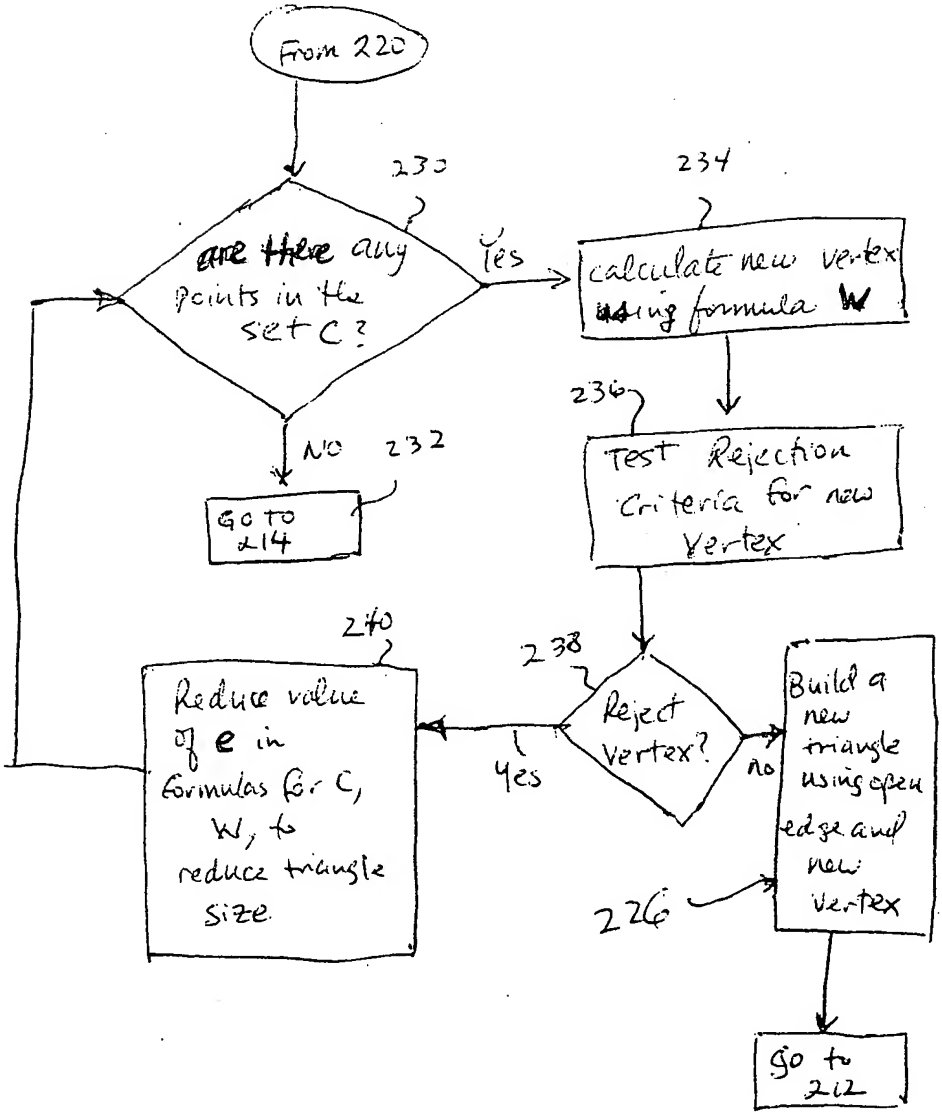
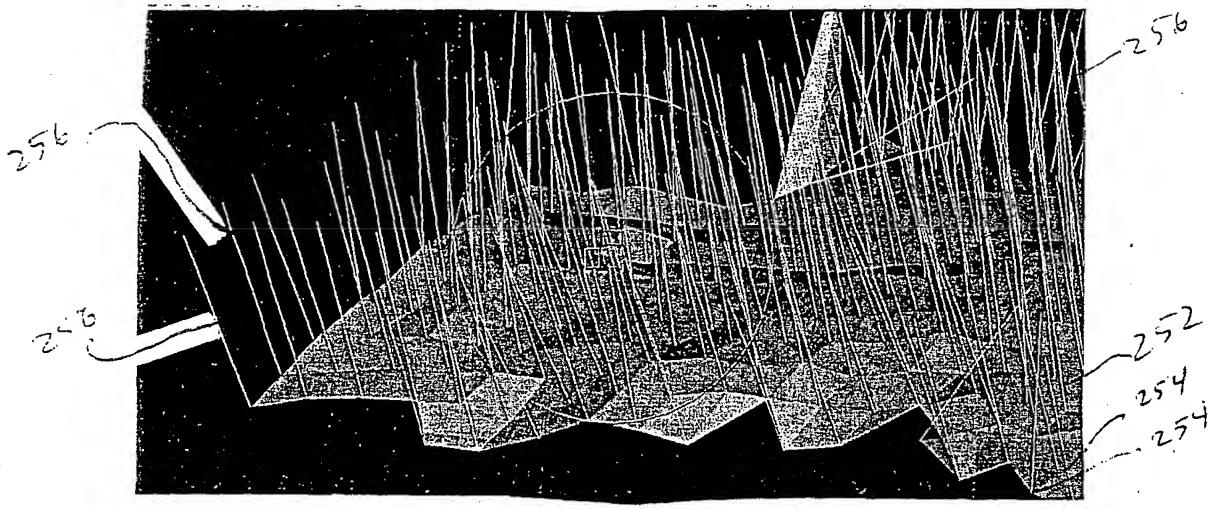

224
From 220
230
are there any points in the set C?
Yes
234
calculate new vertex using formula W
236
Test Rejection Criteria for new Vertex
238
Reject Vertex?
yes
no
240
Reduce value of e in formulas for C, W, to reduce triangle size
Build a new triangle using open edge and new vertex
226
NO
232
GO TO 214
go to 212

Fig. 10A

Fig. 10C



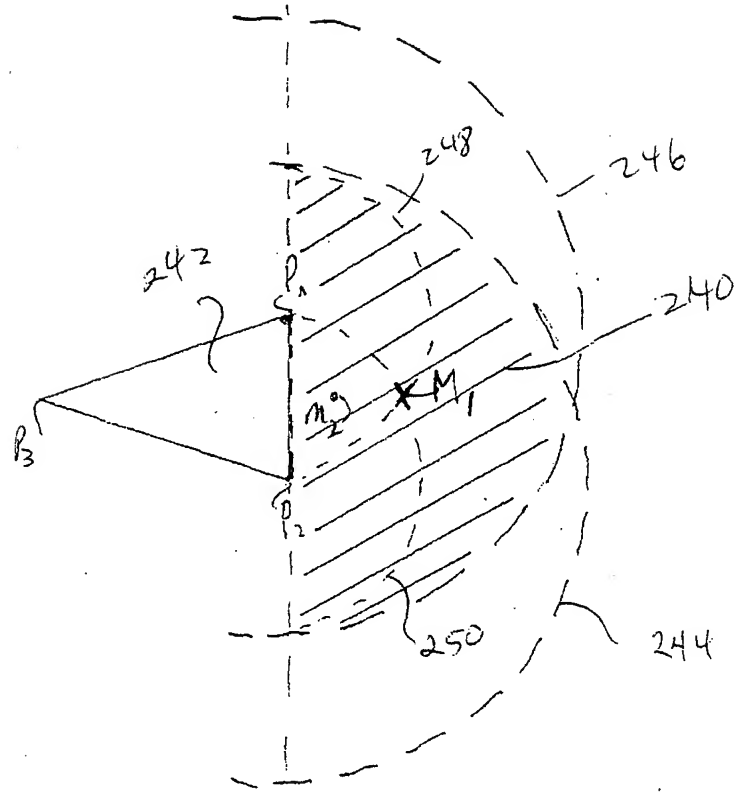


Fig. 10B

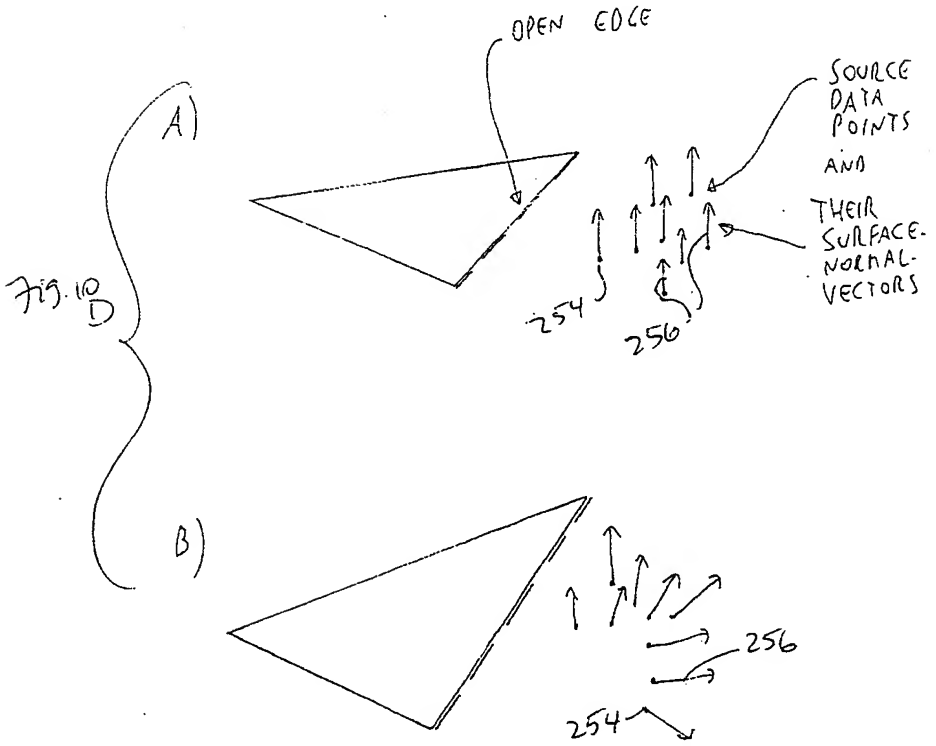


Fig. 10 D

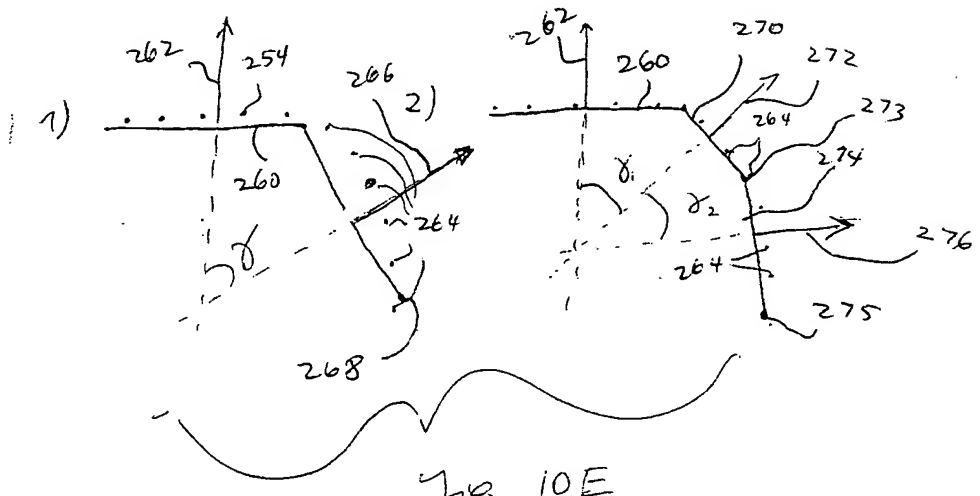


Fig. 10E

Automatic Crown Detection

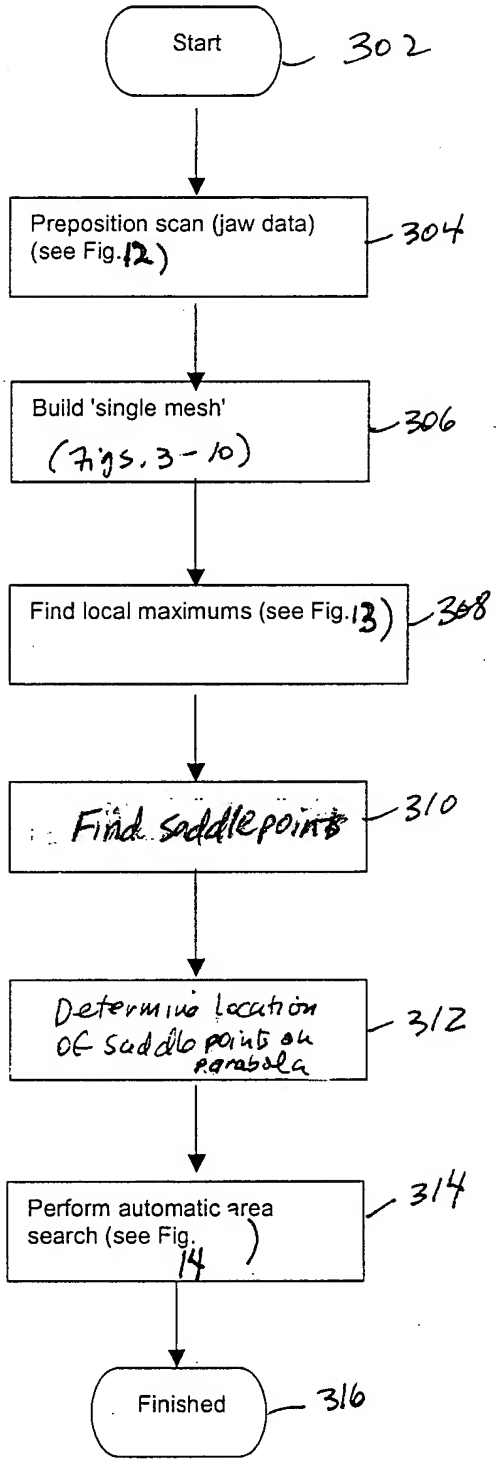


Fig. 11

Positioning

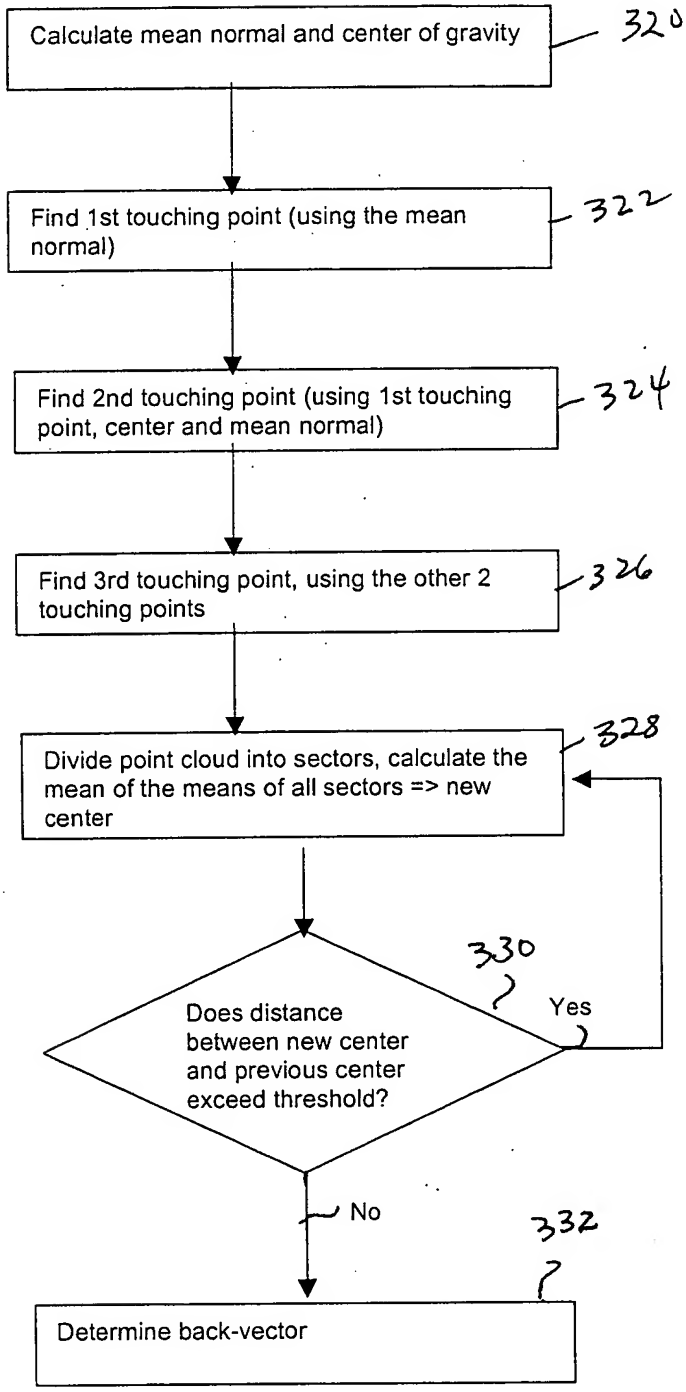


Fig. 12

Find local maximums

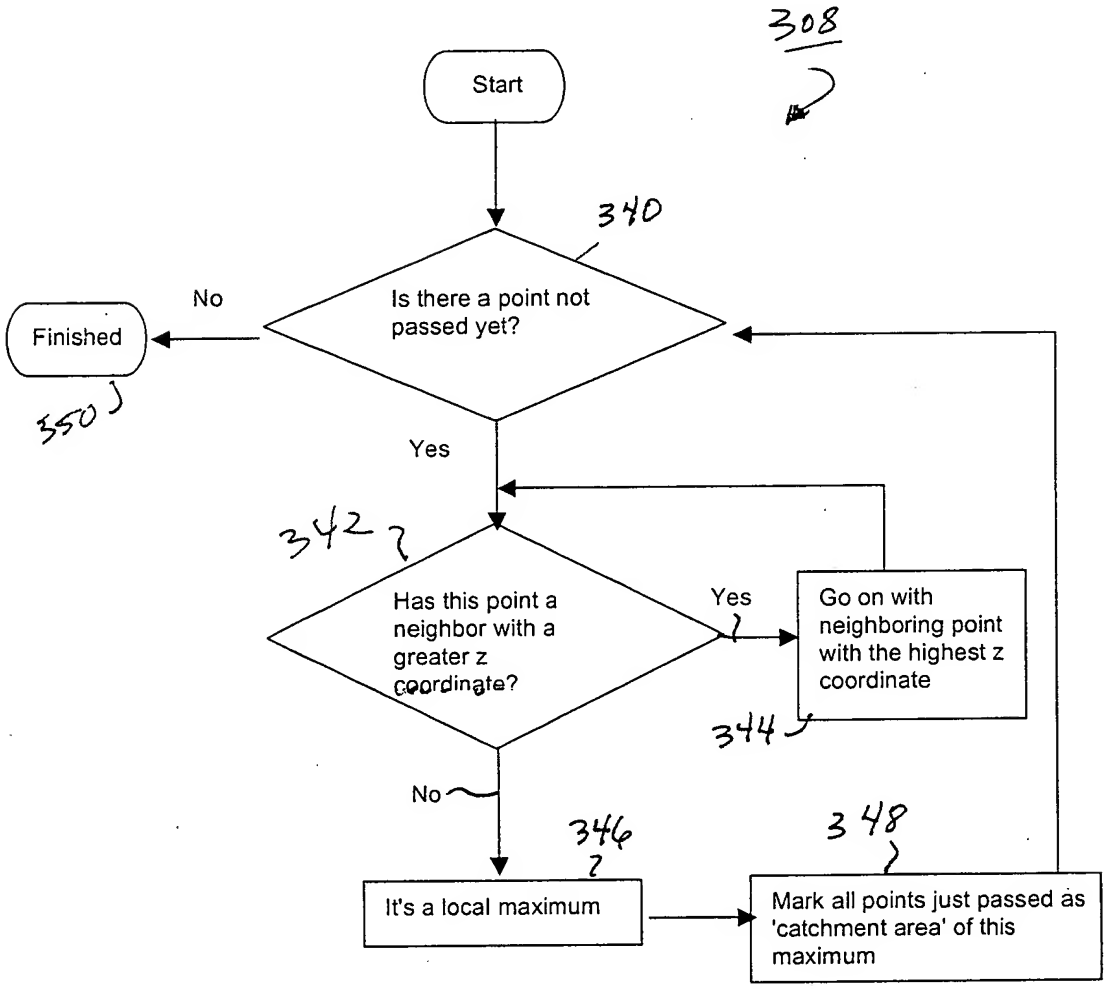


Fig. 13

314

Automatic Area Search

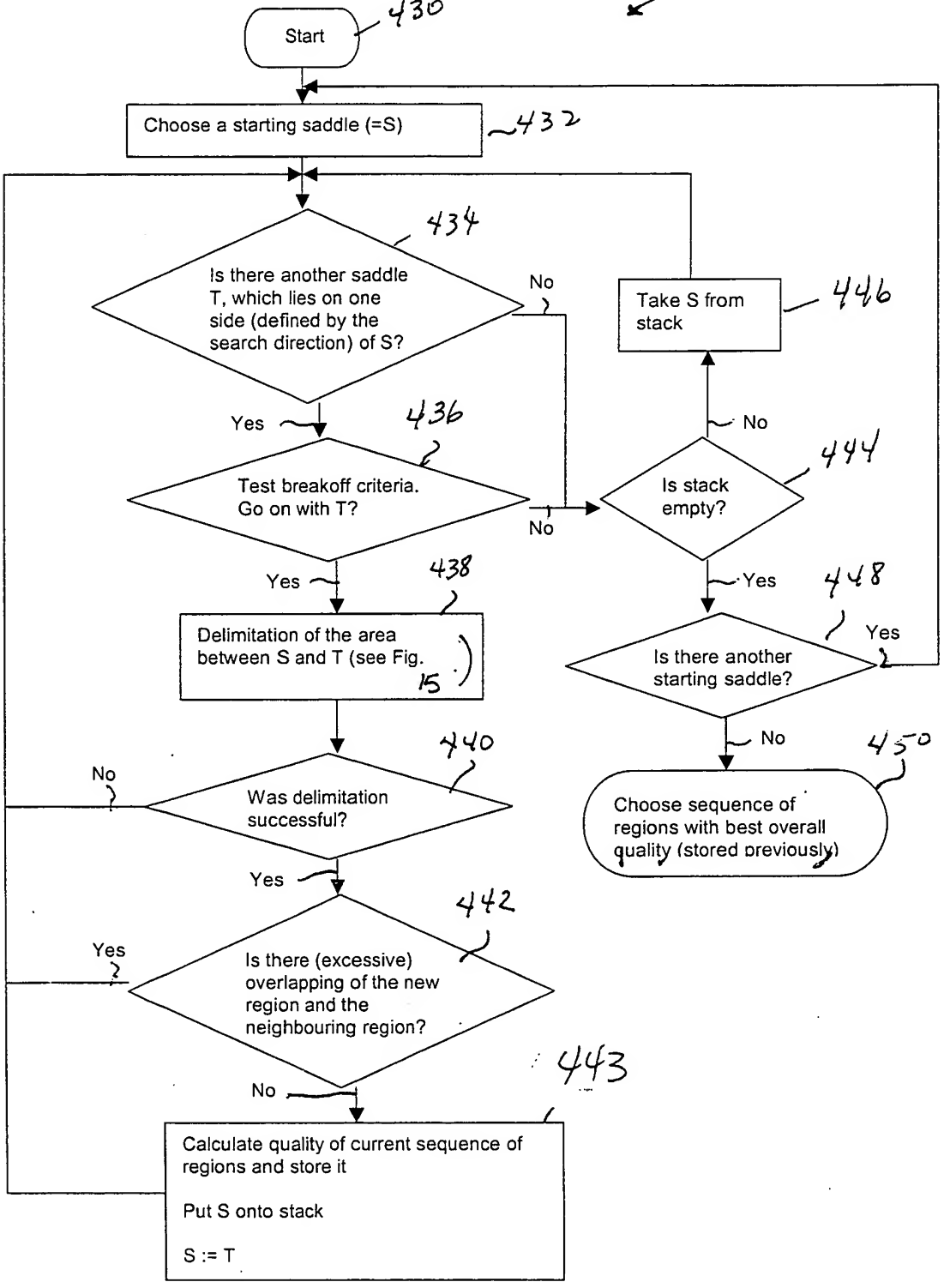


Fig. 14

Delimitation of an Area

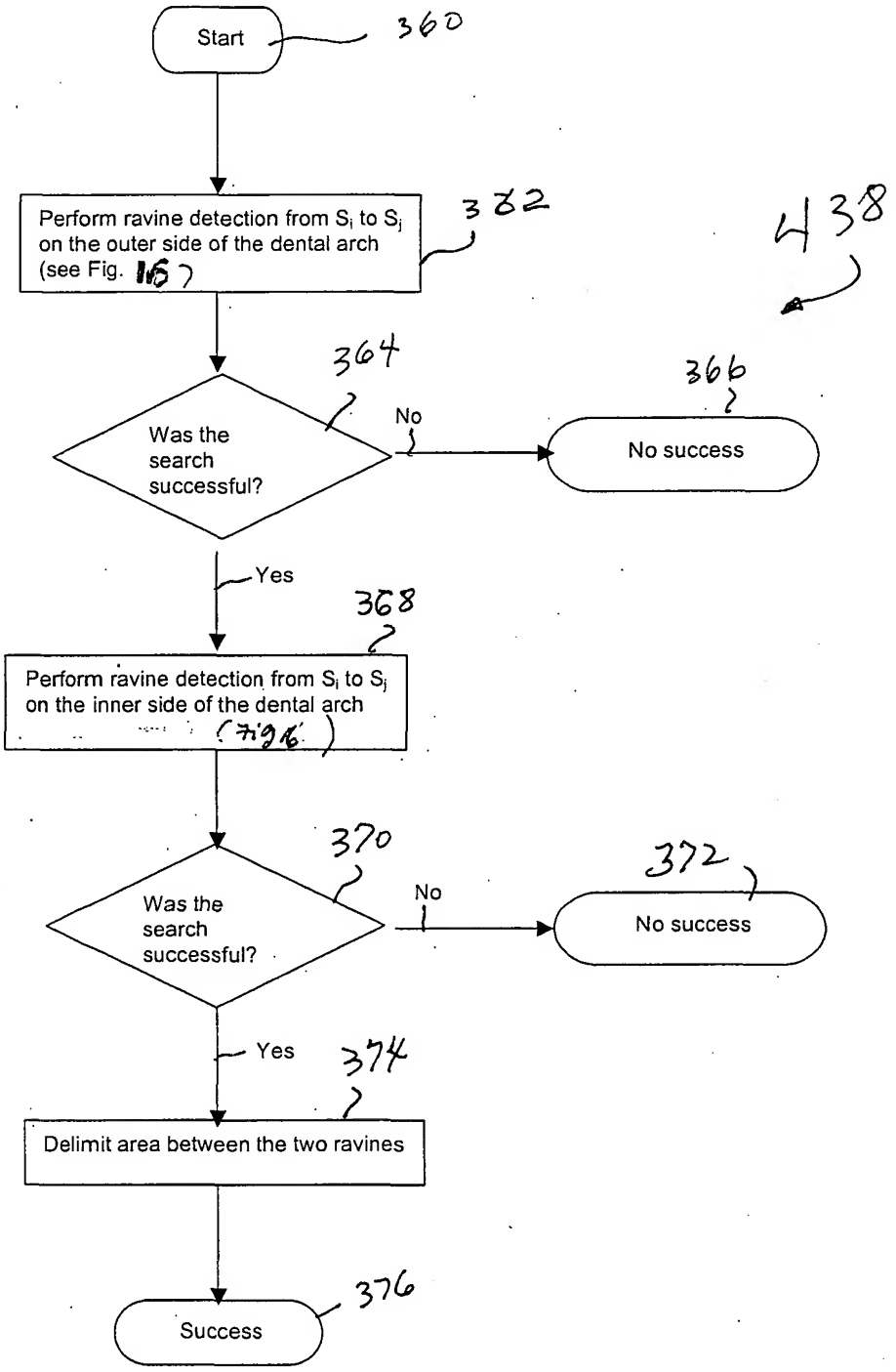


Fig. 15

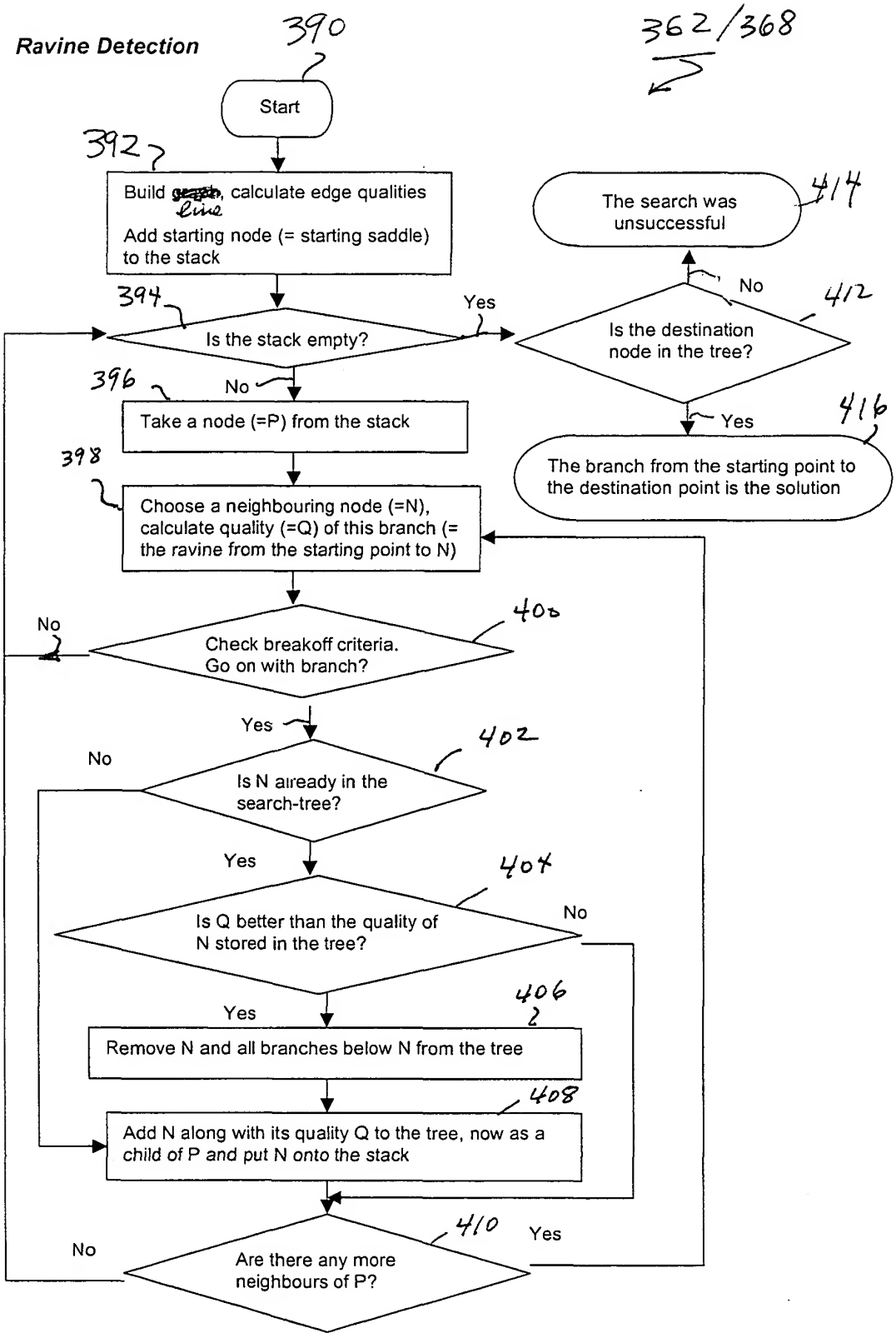

Ravine Detection
390
362/368
Start
392
Build search line, calculate edge qualities
Add starting node (= starting saddle) to the stack
394
Is the stack empty?
Yes
No
396
Take a node (=P) from the stack
398
Choose a neighbouring node (=N), calculate quality (=Q) of this branch (= the ravine from the starting point to N)
400
Check breakoff criteria. Go on with branch?
No
Yes
402
Is N already in the search-tree?
No
Yes
404
Is Q better than the quality of N stored in the tree?
No
Yes
406
Remove N and all branches below N from the tree
408
Add N along with its quality Q to the tree, now as a child of P and put N onto the stack
410
Are there any more neighbours of P?
No
Yes
412
Is the destination node in the tree?
No
Yes
414
The search was unsuccessful
416
The branch from the starting point to the destination point is the solution

Fig. 16

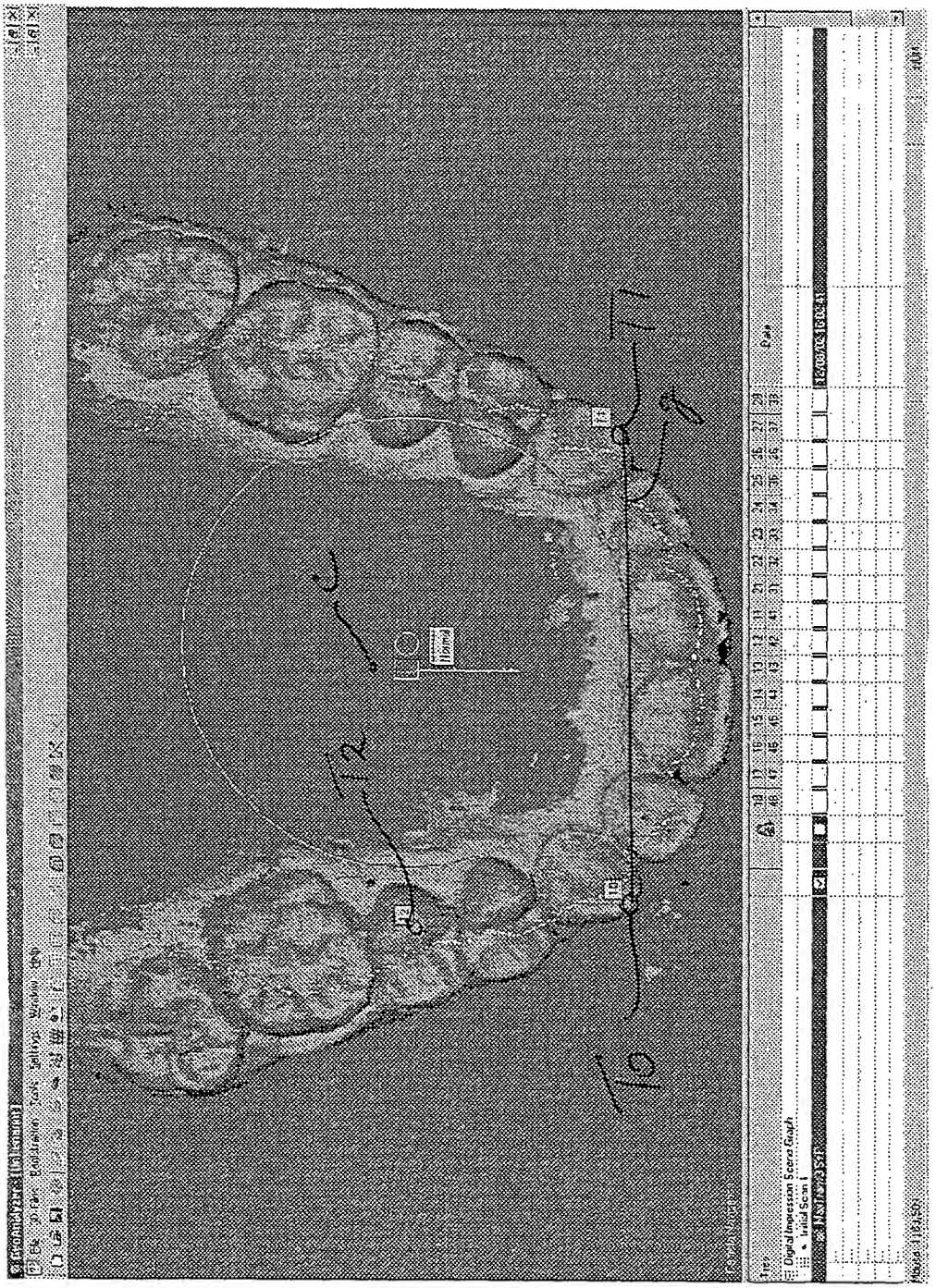


Fig. 17

500
504
506
502
510
505
M 14
M 13
M 25
M 26
M 31
M 24
M 23
M 15
M 27
M 28
M 3
M 32
M 33
M 35
M 36
M 30
M 29
M 47
M 48
M 38
Tree
Digital Impression Scene Graph
Initial Scan 1
Sil of Maxillal Ioint_SKP (0 mi) (0 triangles)
FreeMotel
SaddleIndices
Date
12/06/02 16:09:01
12/06/02 16:09:01
12/06/02 16:09:01
12/06/02 16:09:01

Fig. 18

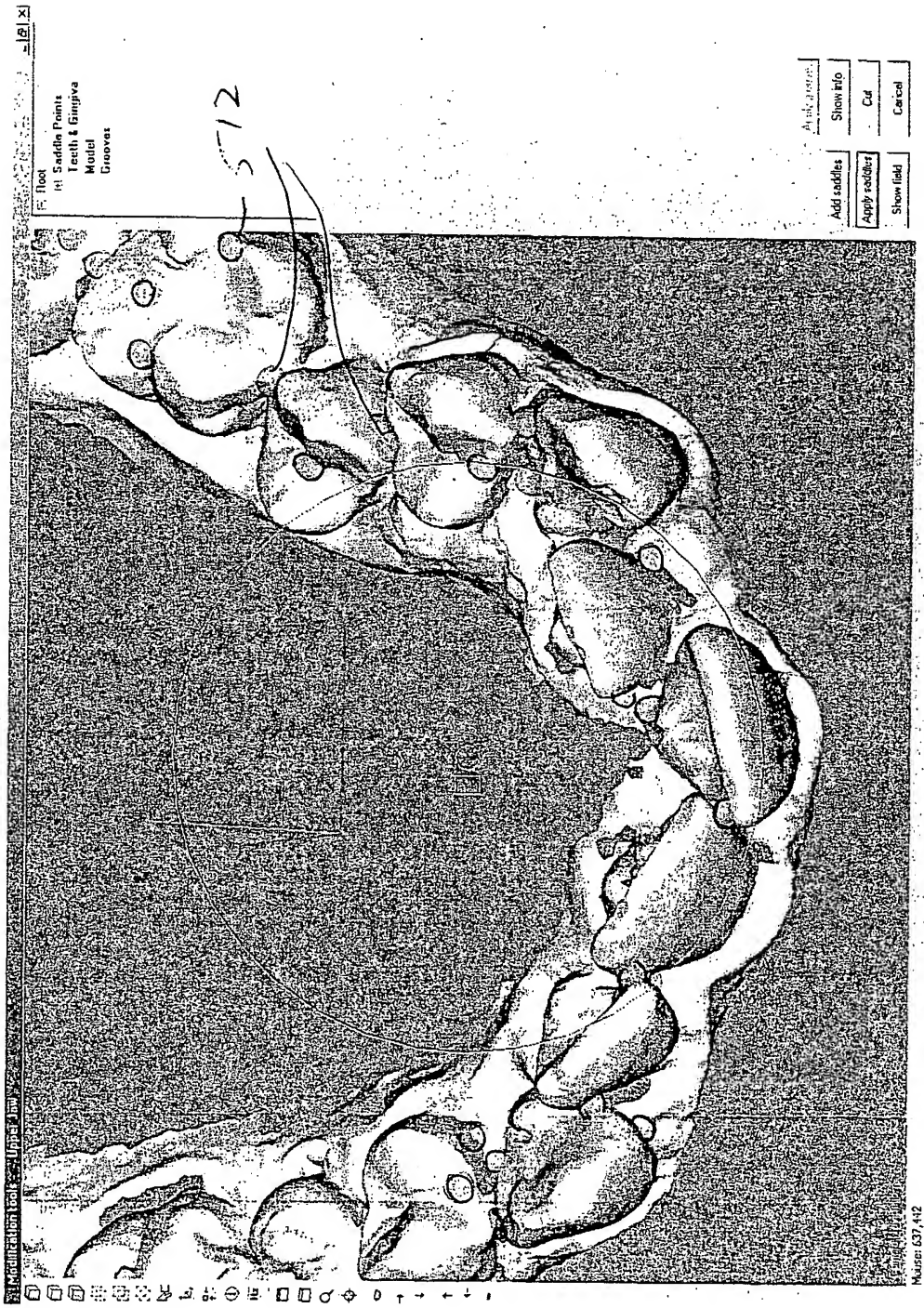

Tool
Saddle Points
Teeth & Gingiva
Model
Grooves
512
Add saddles
Apply saddles
Show field
Show info
Cut
Cancel
Hauser 637,442

Fig. 19

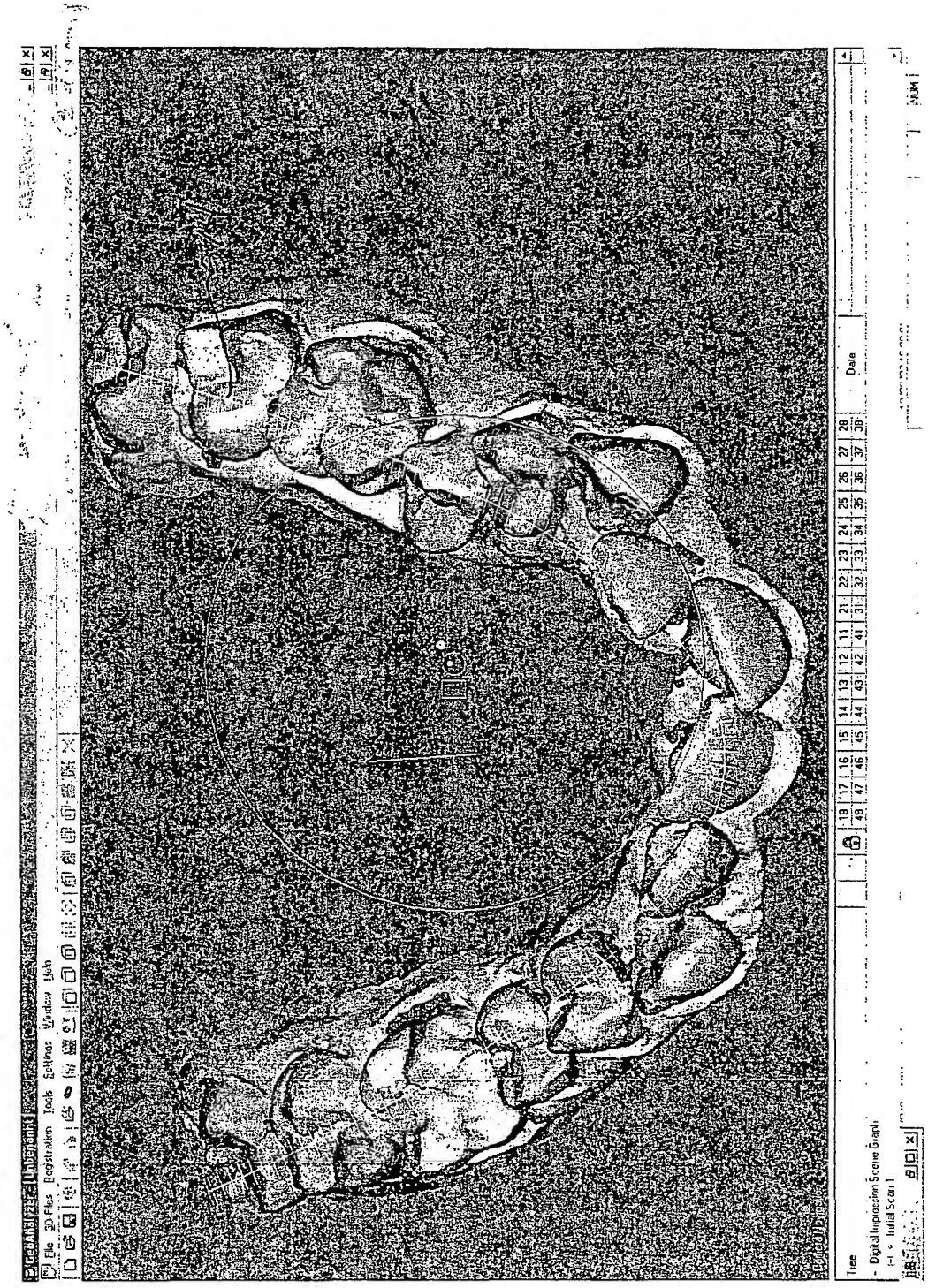

File 3D-Files Registration Tools Settings Windows Help
Tree
Date

Fig. 20

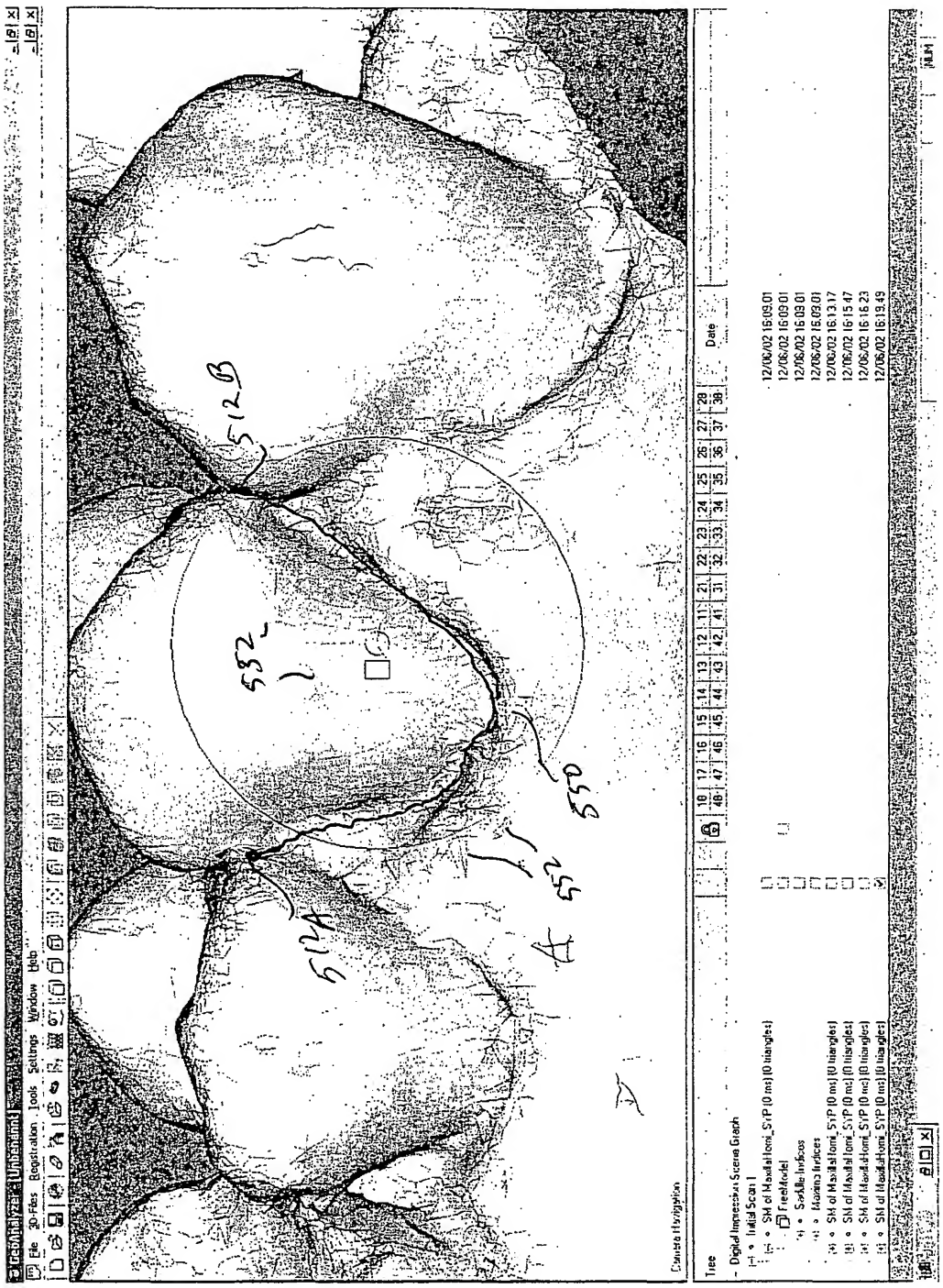


Fig. 21

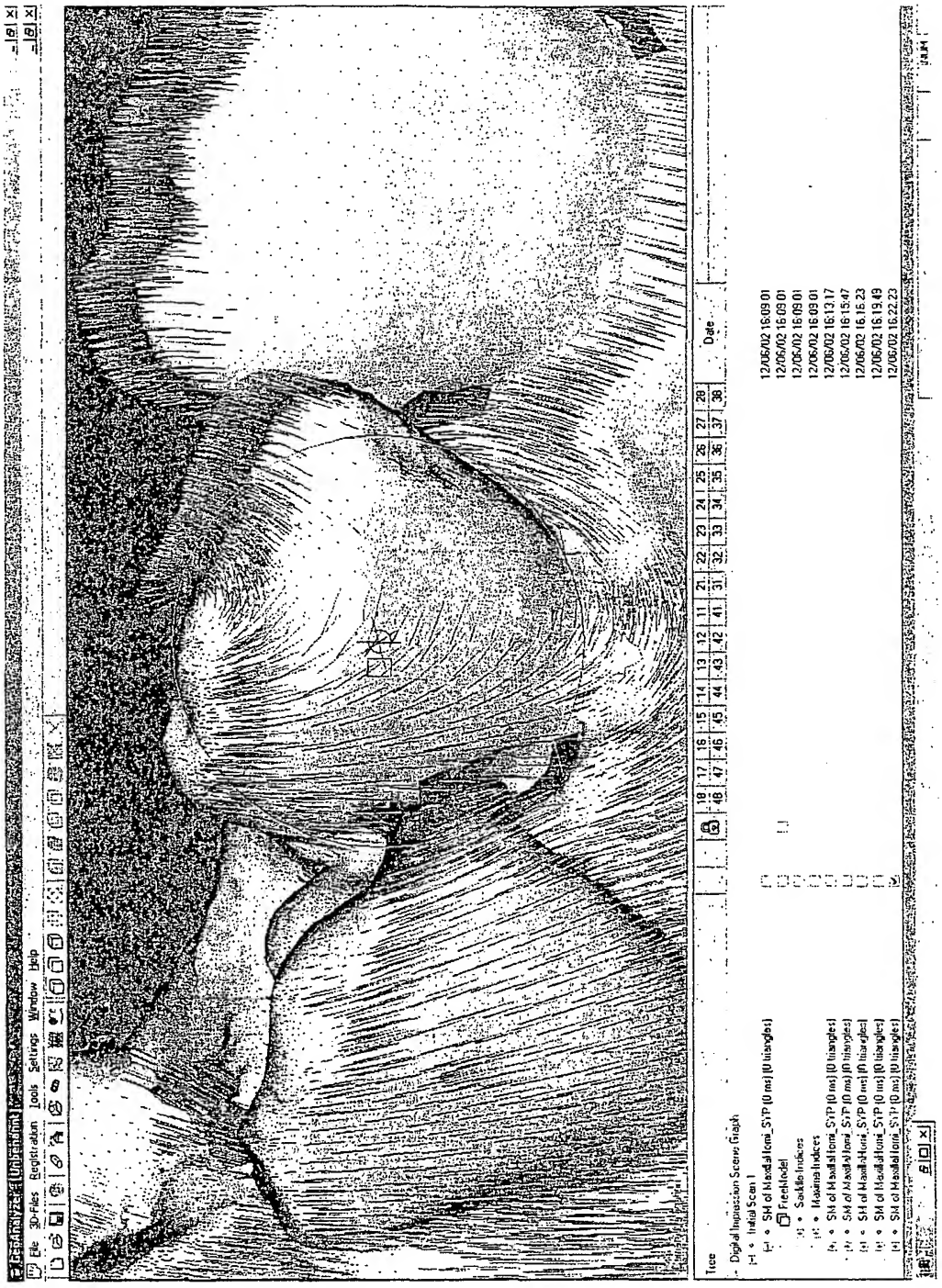

Geomagic Studio - [Untitled]
File 3D-Files Registration Tools Settings Window Help
Tree
Digital Impression Scans Graph
Initial Scan 1
SM of Mandibula_SYP (0 ms) (0 triangles)
FreeModel
Saddle Indices
Maxima Indices
SM of Maxillaris_SYP (0 ms) (0 triangles)
SM of Mandibula_SYP (0 ms) (0 triangles)
SM of Maxillaris_SYP (0 ms) (0 triangles)
SM of Mandibula_SYP (0 ms) (0 triangles)
SM of Maxillaris_SYP (0 ms) (0 triangles)
Date
12/05/02 16:09:01
12/05/02 16:09:01
12/05/02 16:09:01
12/05/02 16:09:01
12/05/02 16:13:17
12/05/02 16:15:47
12/05/02 16:16:23
12/05/02 16:19:49
12/05/02 16:22:23

Fig. 22

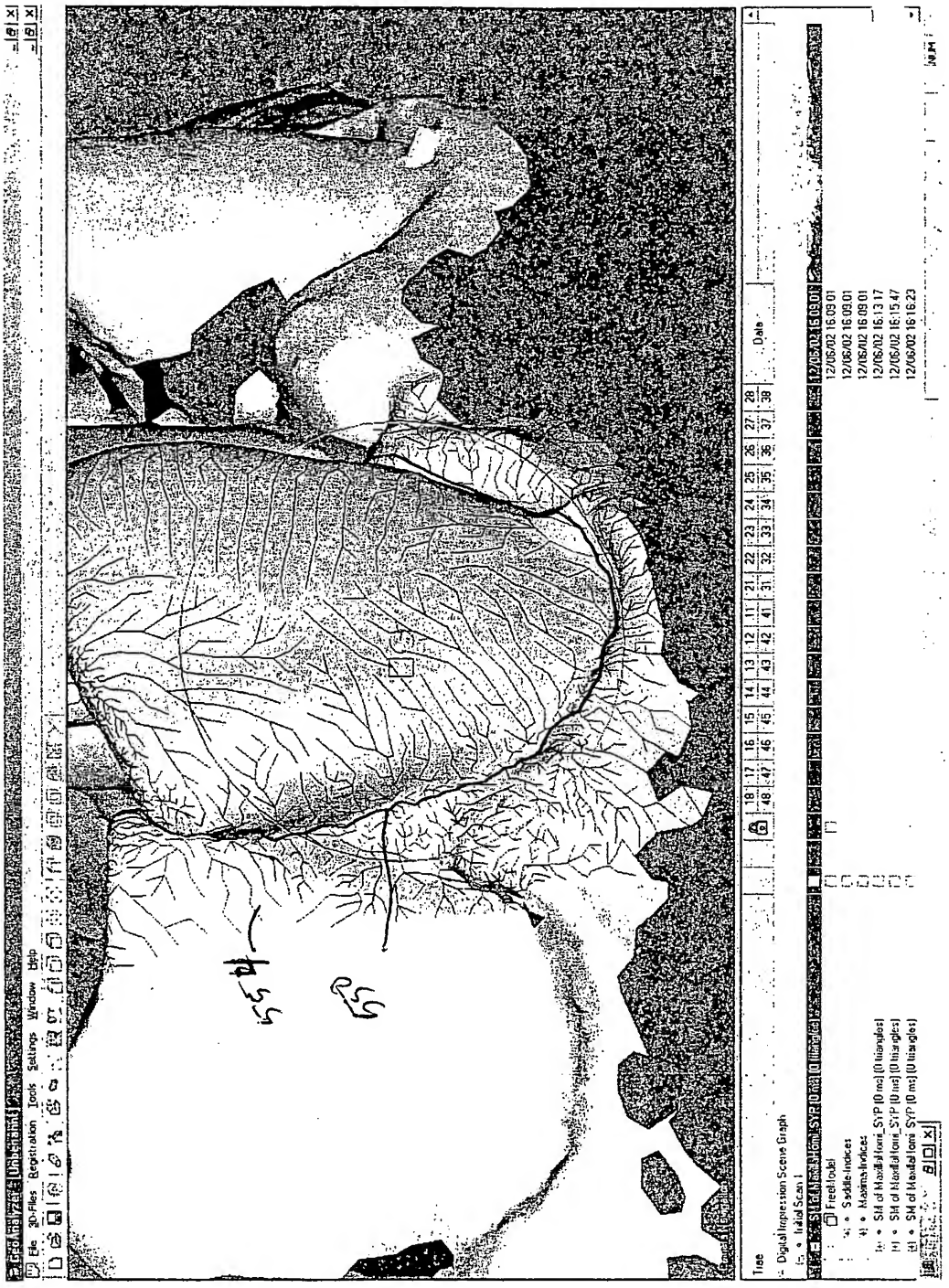


Fig. 23

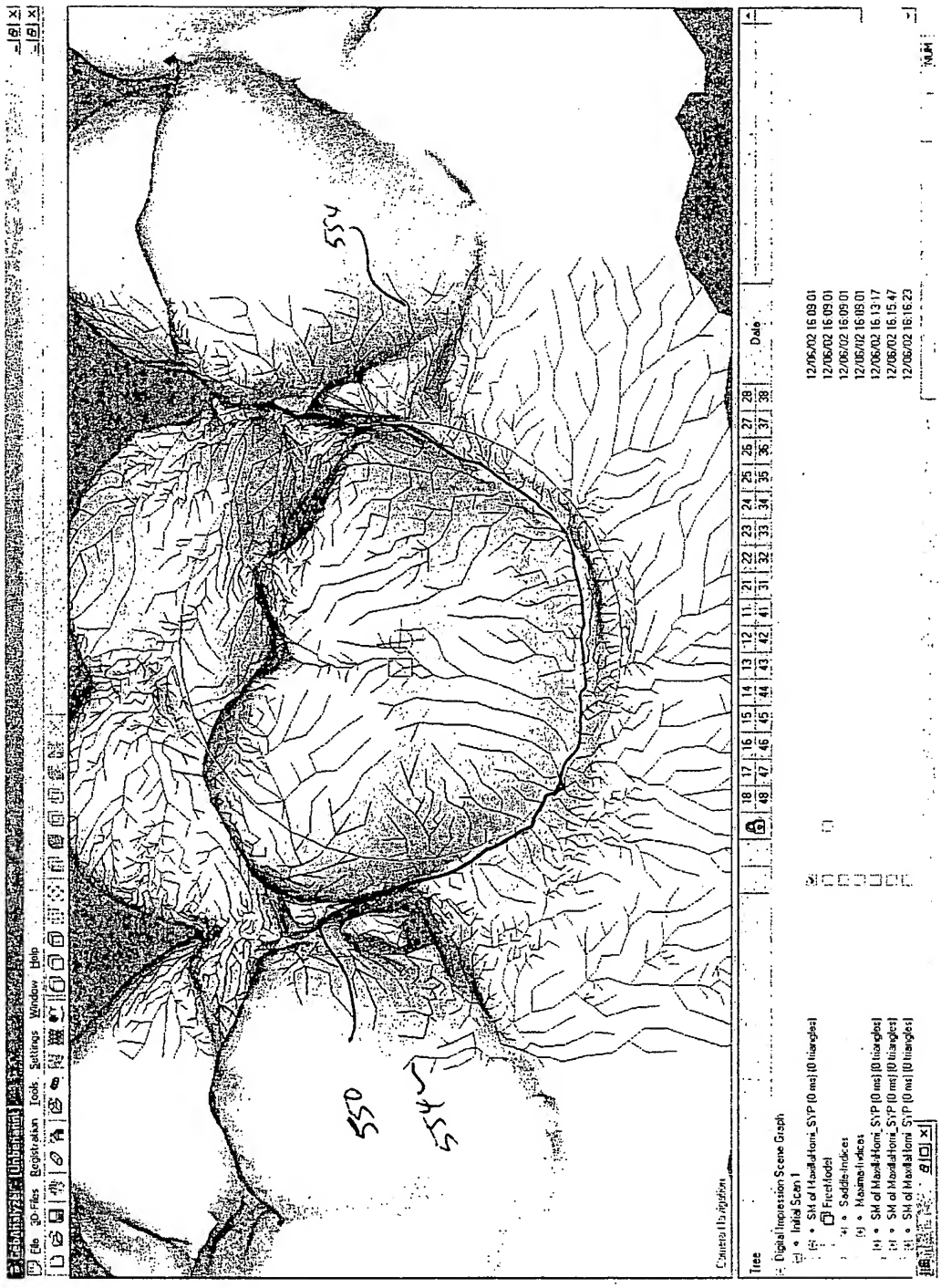

554
550
554
Tree
Digital Impression Scene Graph
Initial Scan 1
SM of MaxillaHoni_SYP [0 ms] [0 triangles]
FreeModel
SaddleIndices
MaximalIndices
SM of MaxillaHoni_SYP [0 ms] [0 triangles]
SM of MaxillaHoni_SYP [0 ms] [0 triangles]
SM of MaxillaHoni_SYP [0 ms] [0 triangles]
Date
12/06/02 16:09:01
12/06/02 16:09:01
12/06/02 16:09:01
12/06/02 16:09:01
12/06/02 16:13:17
12/06/02 16:15:47
12/06/02 16:16:23

Fig. 24

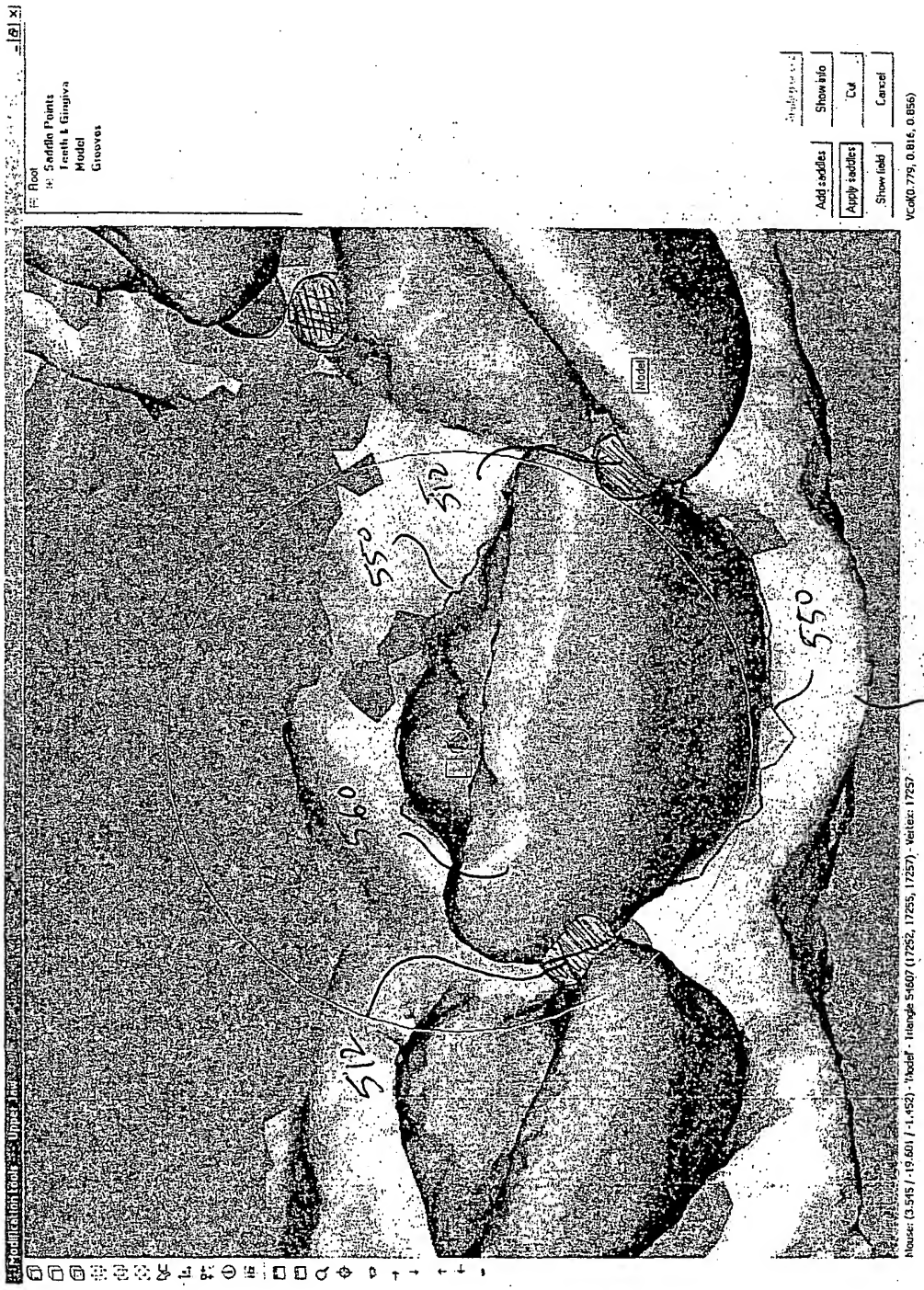

Root
Saddle Points
Teeth & Gingiva
Model
Grooves
Add saddles
Show info
Apply saddles
Cut
Show field
Cancel
Model
512
550
550
550
550
512
Vcut(0.779, 0.816, 0.856)

FIG. 25

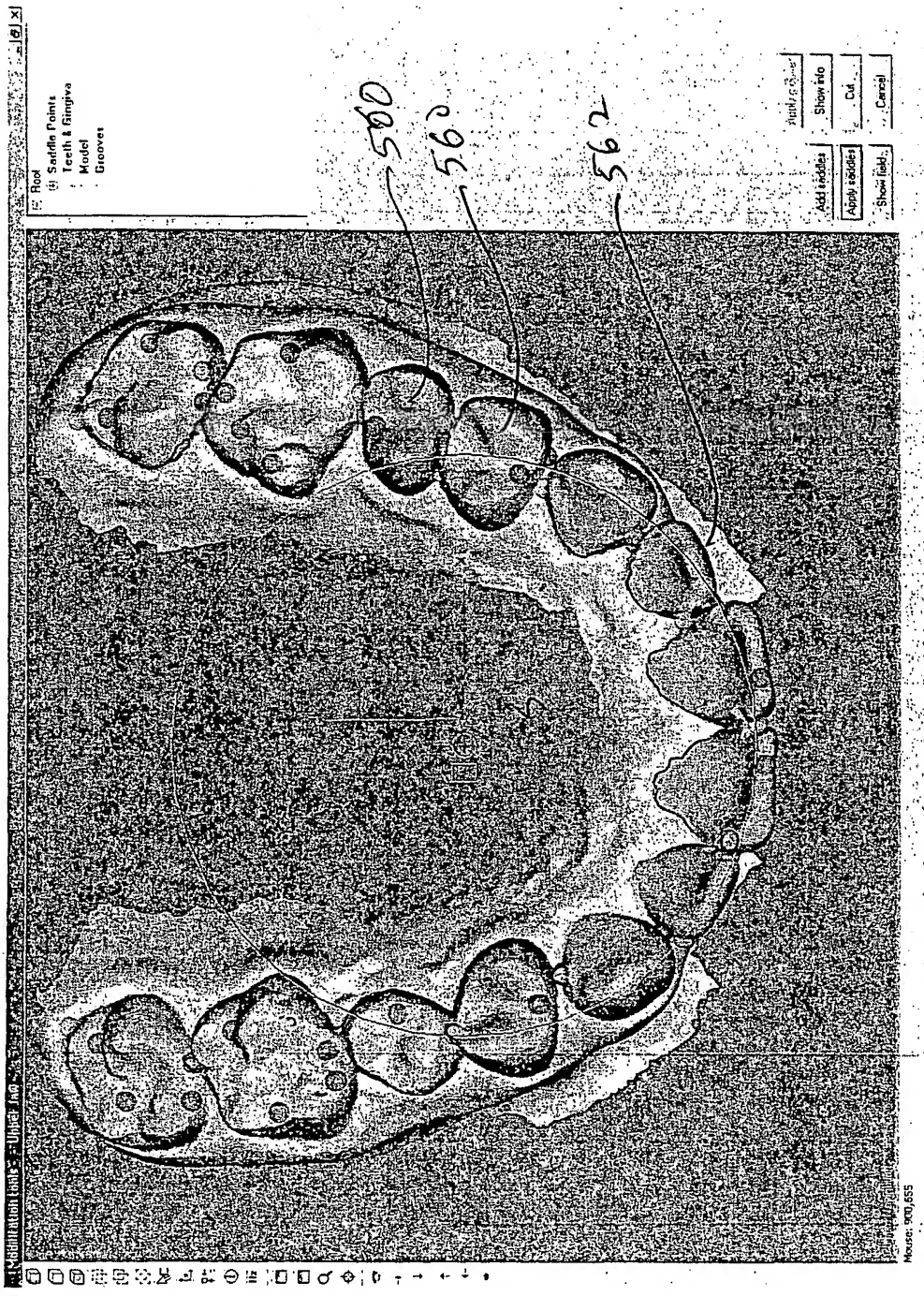

Root
Saddle Points
Teeth & Gingiva
Model
Grooves
Add saddles
Apply saddles
Show field
Show info
Cut
Cancel
295
295
295

Fig. 28